Amendments to the Specification

A new paragraph has been added to page 1 before line 5.

This application is a division of Application No. 10/150,917 filed May 22, 2002.

The paragraph starting at page 1, line 20 has been amended as follows.

~~An~~ One image printing apparatus ~~whish~~ which meets these demands is an ink-jet printer.

The paragraph starting at page 6, line 6 has been amended as follows.

A method of solving this problem is to count the number of elements to be simultaneously driven in accordance with printing data, and to control the driving pulse and driving voltage, as disclosed in Japanese Patent Laid-Open ~~NO.~~ No. 9-11504.

The paragraph starting at page 7, line 16 has been amended as follows.

That is, the above-described pre-pulse P1 and idle time P2 have given time ~~durations or more,~~ durations, which ~~enables~~ enable control operations of increasing the ink

discharge amount, and when the printhead temperature rises, decreasing the printhead temperature.

The paragraph starting at page 9, line 7 has been amended as follows.

To achieve the above object, a management system for an image printing apparatus according to an aspect of the present invention has the following arrangement. That is, an image printing apparatus for printing an image on the basis of input printing data by scanning a carriage for holding a printhead having a plurality of printing elements, relatively to a printing medium in a direction crossing an alignment direction of the plurality of printing elements ~~comprising~~ comprises first driving means for grouping the plurality of printing elements into a plurality of blocks every predetermined number of printing elements, and driving the plurality of blocks by time division, second driving means for driving any one of the plurality of blocks by using, as a driving timing signal for performing printing once, a plurality of driving timing signals respectively used to drive the plurality of blocks by time division, and image printing means for selecting either one of the first and second driving means, and printing the image.

The paragraph starting at page 9, line 26 has been amended as follows.

To achieve the above object, a method of controlling an image forming apparatus according to another aspect of the present invention has the following steps.

That is, a method of controlling an image printing apparatus for printing an image on the basis of input printing data by scanning a carriage for holding a printhead having a plurality of printing elements, relatively to a printing medium in a direction perpendicular to an alignment direction of the plurality of printing elements ~~comprising the~~ comprises a first driving step of grouping the plurality of printing elements into a plurality of blocks every predetermined number of printing elements, and driving the plurality of blocks by time division, ~~the~~ a second driving step of driving any one of the plurality of blocks by using, as a driving timing signal for performing printing once, a plurality of driving timing signals respectively used to drive the plurality of blocks by time division, and ~~the~~ an image printing step of selecting either one of the first driving step and the second driving step, and printing the image.

The paragraph starting at page 10, line 20 has been amended as follows.

To achieve the above object, a computer-readable storage medium according to still another aspect of the present invention has the following program codes. That is, a computer-readable storage medium which stores a control program for controlling an image printing apparatus for printing an image on the basis of input printing data by scanning a carriage for holding a printhead having a plurality of printing elements, relatively to a printing medium in a direction perpendicular to an alignment direction of the plurality of printing elements is characterized in that the control program comprises a program code of ~~the~~ a first driving step of grouping the plurality of printing elements into a

plurality of blocks every predetermined number of printing elements, and driving the plurality of blocks by time division, a program code of ~~the~~ a second driving step of driving any one of the plurality of blocks by using, as a driving timing signal for performing printing once, a plurality of driving timing signals respectively used to drive the plurality of blocks by time division, and a program code of ~~the~~ an image printing step of selecting either one of the first driving step and the second driving step, and printing the image.

The paragraph starting at page 26, line 18 has been amended as follows.

An ink discharge amount when an image area (predetermined area) shown in Fig. 2A is to be printed using normal double-pulse driving is calculated. The ink discharge amount (one droplet) from each nozzle shown in Fig. 2A is about 6 pl. The ink discharge amount (36 droplets), i.e., landing ink amount in an image area (predetermined area) printed using 36 droplets discharged from blocks 0 to 11, is 6 pl x 36 droplets = 216 pl/predetermined area.

The paragraph starting at page 28, line 27 has been amended as follows.

More specifically, as shown in Fig. 1C, in the decimation (n = 2) mode, the pulse signal (P1 = 0.0, P2 = 0.0, and P3 = 0.4 μ sec) of the first block and the pulse signal (P1 = 0.0, P2 = 0.2 μ sec, and P3 = 0.7 μ sec) of the second block, which are successive as shown in Fig. 12A, are combined (~~synthesize~~ synthesized) into one pulse signal.

The paragraph starting at page 31, line 21 has been amended as follows.

In this embodiment, the block enable signal (timing signal for block driving) of block 0 is combined with the block enable signal of block 1 and 2, and the block enable signal of block 3 is combined with the block enable signal of block 4, and 5,..., respectively. The pulse signal width of the combined pulse signal (block enable signal shown in Fig. 1D) is three times ~~of~~ that of the normal double-pulse signal (block enable signal shown in Fig. 1A).

The paragraph starting at page 32, line 3 has been amended as follows.

More specifically, as shown in Fig. 1D, in the decimation (n = 3) mode, the pulse signal (P1 = 0.0, P2 = 0.0, and P3 = 0.1 μ sec) of the first block, the pulse signal (P1 = 0.0, P2 = 0.1 μ sec, and P3 = 0.4 μ sec) of the second block, and the pulse signal (P1 = 0.0, P2 = 0.0 μ sec, and P3 = 1.0 μ sec) of the third block, which are successive as shown in Fig. 12A, are combined (~~synthesize~~ synthesized) into one pulse signal.

The paragraph starting at page 40, line 9 has been amended as follows.

As the typical arrangement and principle of the ink-jet printing system, one practiced by use of the basic principle disclosed in, for example, U.S. Patent Nos. 4,723,129 and 4,740,796 is preferable. The above system is applicable to either one of a

so-called ~~an~~ on-demand type and ~~a~~ continuous type. Particularly, in the case of the on-demand type, the system is effective because, by applying at least one driving signal, which corresponds to printing information and gives a rapid temperature rise exceeding nucleate boiling, to each of electrothermal transducers arranged in correspondence with a sheet or liquid channels holding a liquid (ink), heat energy is generated by the electrothermal transducer to effect film boiling on the heat acting surface of the printing head, and consequently, a bubble can be formed in the liquid (ink) in one-to-one correspondence with the driving signal. By discharging the liquid (ink) through a discharge opening by growth and shrinkage of the bubble, at least one droplet is formed. If the driving signal is applied as a pulse signal, the growth and shrinkage of the bubble can be attained instantly and adequately to achieve discharge of the liquid (ink) with ~~the~~ particularly high response characteristics.

The paragraph starting at page 43, line 27 has been amended as follows.

Further, the storage medium, such as a floppy disk, a hard disk, an optical disk, a magneto-optical disk, a CD-ROM, a CD-R, a magnetic tape, a non-volatile type memory card, and a ROM, can be used for providing the program code.

The paragraph starting at page 44, line 5 has been amended as follows.

Furthermore, additional functions according to the above embodiments are realized by executing the program code, which are read by a computer. The present invention includes a case where an OS (operating system) or the like working on the compute performs a part of or an entire process in accordance with designations of the program code and realizes functions according to the above embodiments.

The paragraph starting at page 44, line 13 has been amended as follows.

Furthermore, the present invention also includes a case where, after the program code read from the storage medium are written in a function expansion card which is inserted into the computer or in a memory provided in a function expansion unit which is connected to the computer, a CPU or the like contained in the function expansion card or function expansion unit performs a part of or an entire process in accordance with designations of the program code and realizes functions of the above embodiments.

The paragraph starting at page 44, line 27 has been amended as follows.

As is apparent from the above description, according to the present invention, pulses are controlled in a few ~~multiple~~ multiples of block times so as to form one dot by at least two successive blocks when the temperature rises, an image with a high duty is to be printed, or the pulse width increases under the control of a voltage drop. While data is decimated, the discharge amount and landing position are appropriately

controlled. Even in high-speed driving, decimation and printing can be easily achieved. In addition, the landing ink amount, control of the discharge amount, and the landing position can be further optimized, realizing ~~high-efficient~~ highly efficient printing.